



NVLAP LAB CODE 100228-0



ARMSTRONG
ACOUSTICS
LABORATORY

Armstrong World Industries
Innovation Center, P. O. Box 3001
Lancaster, PA 17604
717 396-6225

SOUND ABSORPTION TEST REPORT

Test Number: A-49408-0228

Report Issued: 1/27/2006

Test Date: 1/17/2006

For: Armstrong World Industries Inc.
2500 Columbia Avenue
Lancaster, PA 17604

Specimen Designation: Armstrong Ultima Canopies

The test method conforms explicitly to the requirements of ISO 354-Acoustics-Measurement of sound absorption in a reverberation room:ISO 354-03. The Armstrong Acoustics Laboratory is accredited by NVLAP of the Department of Commerce as having the competence to perform this test in accordance with the prescribed test method. A description of the facility and measuring technique is available separately.

Material Description: Three curved mineral fiber panels

Face Finish: DuraBrite Surface

Back Finish: DuraBrite Surface

Nominal Unit Size: 1.14 m x 1.95 m x 31.8 mm (45" x 77" x 1.25")

Physical Unit Size 1.137 m x 1.949 m x 31.75 mm or (44.75" x 76.75" x 1.25")

Unit Weight per Area: 9.80 kg/m², (2.01 lb/ft²)

Total Sample Area: 6.67 m², (71.76 ft²) counting one surface of each panel and no edges.

Conditioning: The test was performed in a test room at 20.1 deg C, (68.2 deg F), and 65.1 %RH. The conditions during the bare room test were at 19.8 deg C, (67.7 deg F), and 67.7 %RH. The sample was conditioned at least 20 hours at 21+/-3 deg C, (70+/-5 deg F), and 50+/-5% RH.

Specimen Installation: Three panels were mounted using the J mounting technique specified in ISO 354 Annex B which requires each specimen to be at least 1 meter from hard boundaries and 2 meters from other specimens. While the geometric centers were at least 2 meters apart, it was not possible to arrange the three panels such that 2 meters of clear space existed between each panel while maintaining the required separation from room boundaries. The closest corners of panels B and C were 1.46 m apart and the closest sides of panels A and C were 1.7 m apart. Since these panels are normally installed hanging from a ceiling, the three panels were supported above the test room floor. Two of the panels, (A and C) were tested with the center of the panel below the ends (concave side up) and the third panel, B, was installed with the center above the ends (concave side down). The ends of all panels were supported 0.61 m (24" from the floor. A diagram of the panel placement in the test room is included in this report.



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Reverberation Room:

Size: 8.18 x 6.22 x 5.23 m, (26.83' x 20.40' x 17.17') with
2.44 x 2.44 x 0.29 m, (8' x 8' x 0.95') recess in ceiling and
2.93 x 0.70 x 0.53 m, (9.60' x 2.31' x 1.75') box for holding collapsed test
frame.

Volume: 266.7 m³, (9420 ft³)

Surface Area: 255 m², (2747 ft²)

Diffuser Configuration:

This one rotating diffuser system that consists of a section of a cone
extending from floor to ceiling and 3 flat diffusers mounted about the axis of
the cone. The area of the diffuser is 42.9 m² (461 ft²).

Microphone Positions: 6

Noise Source: Two speaker cabinets in opposite upper trihedral corners broadcasting
broadband Pink noise (50 Hz – 10,000 Hz).

Limitations of use: The equivalent absorption areas measured by this test method should be used with caution because not only are the areas encountered in practical usage usually larger than the test specimen, but also the sound field is rarely diffuse. Both of these factors will influence the absorption in practical usage. Regardless of the differences and the necessity for judgment, equivalent absorption areas measured by this test method have been used successfully by architects and consultants in the acoustical design of architectural spaces.



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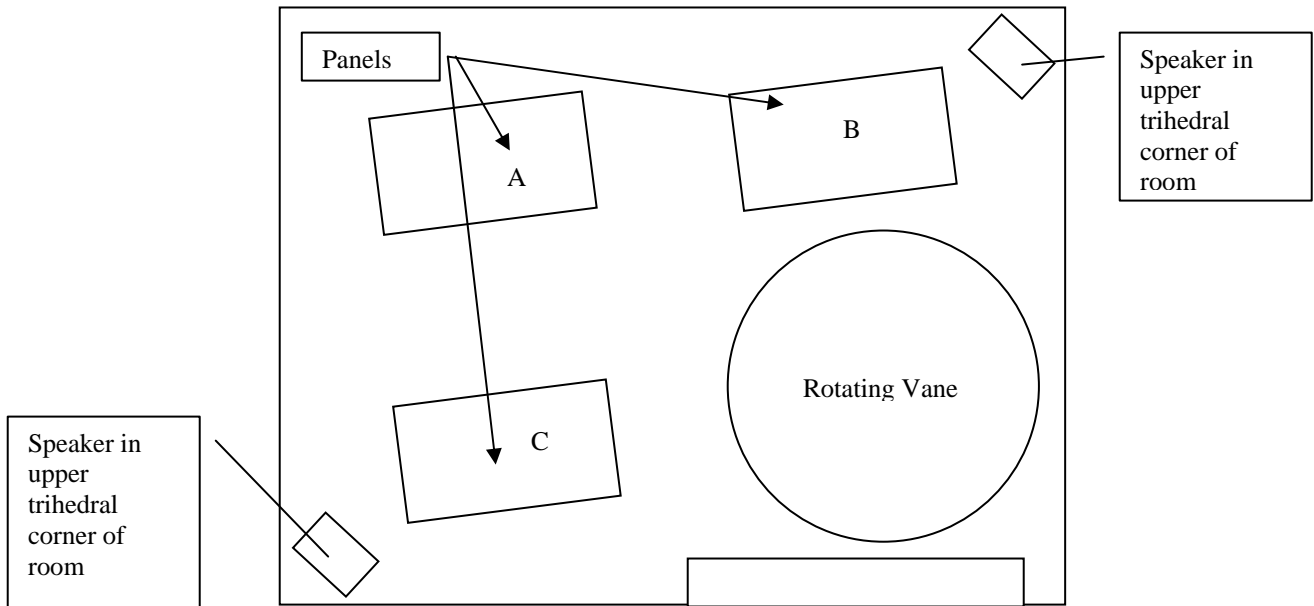
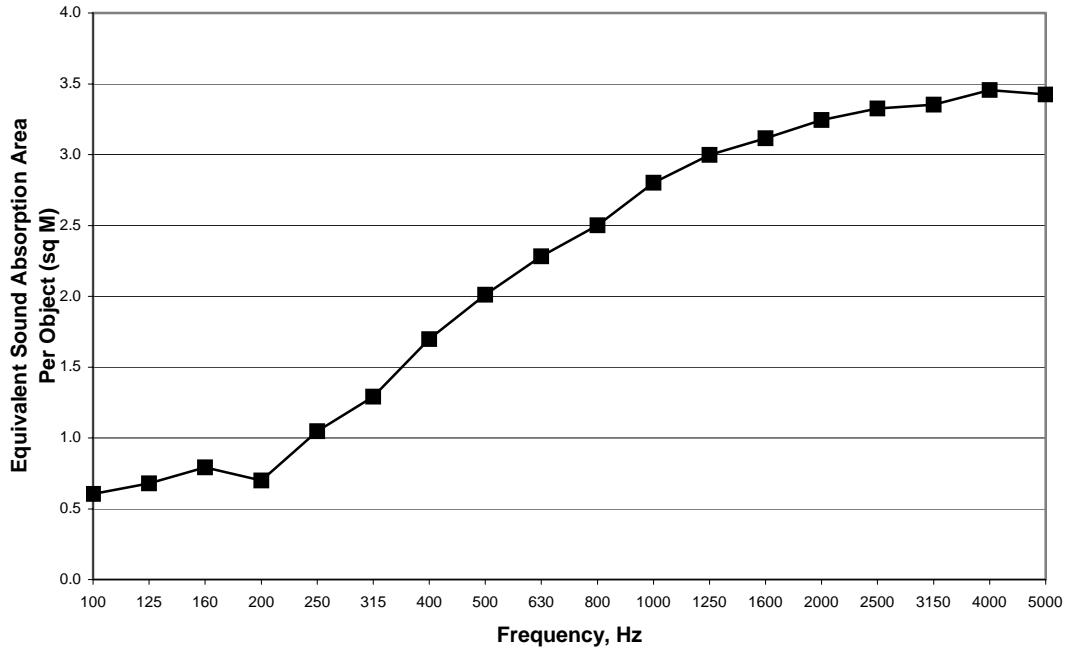
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Room Layout and Sample Position



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Frequency Hz	T1 Treated Room Reverberation Time (Seconds)	T2 Bare Room Reverberation Time (Seconds)	Equivalent Absorption Area Per Sample (sq M)	Absorption Area Estimated 95% Confidence Limit (sq M)
100	4.79	6.01	0.61	0.06
125	4.81	6.24	0.68	0.06
160	4.57	6.12	0.79	0.06
200	4.91	6.47	0.70	0.05
250	4.44	6.59	1.05	0.07
315	4.16	6.67	1.29	0.08
400	3.90	7.27	1.70	0.09
500	3.56	7.12	2.01	0.10
630	3.19	6.49	2.28	0.10
800	2.90	5.90	2.50	0.10
1000	2.63	5.43	2.80	0.11
1250	2.37	4.72	3.00	0.11
1600	2.20	4.22	3.12	0.11
2000	2.00	3.68	3.24	0.11
2500	1.82	3.17	3.32	0.10
3150	1.73	2.93	3.35	0.09
4000	1.59	2.61	3.46	0.09
5000	1.45	2.24	3.42	0.09

The relative standard deviation of the reverberation times are calculated as outlined in section 8.2.2 of ISO. The presented uncertainty is the root of the sum of squares for the bare and treated room reverberation time uncertainty multiplied by the equivalent absorption area.



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Comments:

Traceability: These test results are traceable to NIST through the following NIST and West Caldwell test numbers:

Test Equipment	West Caldwell Recall Number	NIST Test Number
Analyzer	6942-5	822/263868-00
Input Module #1	6942-6	822/263868-00
Input Module #2	6942-7	822/263868-00
Microphone / Preamplifier #1	6942-23 , 6942-53	822/261834-99 D1129, 822/261898-99
Microphone / Preamplifier #2	6942-21 , 6942-36	822/261834-99 D1129, 822/261898-99
Microphone / Preamplifier #3	6942-19 , 6913-4	822/261834-99 D1129, 822/261898-99
Microphone / Preamplifier #4	6942-29 , 6942-56	822/261834-99 D1129, 822/261898-99
Microphone / Preamplifier #5	6942-35 , 6942-54	822/261834-99 D1129, 822/261898-99
Microphone / Preamplifier #6	6942-32 , 6942-4	822/261834-99 D1129, 822/261898-99

Approved by:

Robert Alan Hallman
Facility Manager



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